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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/663,647

09/17/2003

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H0610.0351/P351

3795

24998 7590 07/31/2008

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EXAMINER

BOYER, RANDY

ART UNIT

PAPER NUMBER

1797

MAIL DATE

DELIVERY MODE

07/31/2008

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.



## **DETAILED ACTION**

### ***Response to Amendment***

1. Examiner acknowledges Applicant's response filed 11 June 2008 containing amendments to the claims and remarks.
2. Claims 1-5 are pending.
3. Examiner acknowledges that Applicant's amendment to claims 1, 4, and 5 are sufficient to overcome the previous objections.
4. The previous rejections of claims 1-3 and 5 under 35 U.S.C. 102(b) as anticipated by Hollstein (US 4,956,519) are withdrawn in view of Applicant's amendment to the claims. Likewise, the previous rejections of claims 2 and 4 under 35 U.S.C. 103(a) as being unpatentable over Hollstein (US 4,956,519) are withdrawn in view of Applicant's amendment to the claims.
5. The previous rejections of claims 1-5 under 35 U.S.C. 103(a) as being unpatentable over Chang in view of Yori and Zhang in view of Yori are maintained. The rejections follow.

### ***Claim Rejections - 35 USC § 103***

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office Action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which

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said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

8. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

9. Claims 1-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chang (US 6,080,904) in view of Yori (J. C. Yori et al., *Isomerization of n-Butane on Pt/SO<sub>4</sub><sup>2-</sup>-ZrO<sub>2</sub> and Mechanical Mixtures of Pt/Al<sub>2</sub>O<sub>3</sub> + SO<sub>4</sub><sup>2-</sup>-ZrO<sub>2</sub>*, 153 J. CATAL. 218-223 (1995)).

10. With respect to claims 1-5, Chang discloses a process for the production of high-octane gasoline (see Chang, column 1, lines 19-27; and column 6, lines 35-39) from a hydrocarbon feed stream with C<sub>4</sub>+ hydrocarbons cuts (see Chang, column 6, lines 1-2)

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comprising contacting the feed under isomerization conditions with a catalyst composition consisting of zirconium oxide modified with tungsten oxyanion and hydrogenation component of a Group VIII metal (see Chang, Abstract); wherein the hydrocarbon feed may be a pure paraffin feed having between 4 and 8 carbons (for example, C<sub>7</sub> (heptane)) (see Chang, column 7, lines 1-21); wherein the isomerization conditions comprise presence of hydrogen with a hydrogen to hydrocarbon molar ratio between 0.1 to 5 (see Chang, column 7, lines 21-44), a temperature range from 150°C to 300°C (see Chang, column 7, lines 21-44), a total pressure of between 1 and 40 bar (see Chang, column 7, lines 21-44), and a liquid space velocity of between 0.1 to 30 h<sup>-1</sup> (see Chang, column 7, lines 21-44); wherein the catalyst composition may comprise 10-50 wt% tungsten oxide (see Chang, Example 2), with a remaining amount comprising zirconia and Group VIII metal (see Chang, Example 2); and wherein the Group VIII metal is platinum and/or palladium in an amount of between 0.01 wt% to 5 wt% (see Chang, Example 2).

Chang does not explicitly disclose wherein the catalyst consists of a mixture of aluminum and zirconium oxides modified with tungsten oxyanion.

However, Yori discloses a platinum-based zirconium oxide catalyst for use in the hydroisomerization of n-butane to produce higher octane species (see Yori, page 218). Yori explains that when a platinum-based aluminum oxide catalyst is mechanically mixed together with the platinum-based zirconium oxide catalyst to form a composite catalyst composition consisting of both aluminum and zirconium oxides, the result is a

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catalyst composition having increased stability and sustained catalyst activation (see Yori, page 222).

Therefore, the person having ordinary skill in the art of processes for the production of high-octane gasolines would have been motivated to incorporate use of aluminum oxides in the platinum-based zirconium oxide catalyst of Chang (as taught by Yori) in order to achieve a catalyst composition having increased stability and sustained catalyst activation.

Finally, the person having ordinary skill in the art of processes for the production of high-octane gasolines would have had a reasonable expectation of success in incorporating use of aluminum oxides in the catalyst composition of Chang because: (1) both Chang and Yori are directed to processes for the hydroisomerization of C<sub>4+</sub> hydrocarbon feeds to produce higher octane species; (2) the catalysts of both Chang and Yori are zirconium oxide based catalysts; and (3) Chang explicitly notes the possibility for introducing additional catalyst constituents such as metal oxides (e.g. the aluminum oxides of Yori) into his catalyst (see Chang, column 6, lines 20-27).

11. Claims 1-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zhang (S. Zhang et al., *Anion-Modified Zirconia: Effect of Metal Promotion and Hydrogen Reduction on Hydroisomerization of n-Hexadecane and Fischer-Tropsch Waxes*, 69 FUEL PROC. TECH. 59-71 (2001)) in view of Yori (J. C. Yori et al., *Isomerization of n-Butane on Pt/SO<sub>4</sub><sup>2-</sup>-ZrO<sub>2</sub> and Mechanical Mixtures of Pt/Al<sub>2</sub>O<sub>3</sub> + SO<sub>4</sub><sup>2-</sup>-ZrO<sub>2</sub>*, 153 J. CATAL. 218-223 (1995)).

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12. With respect to claims 1-5, Zhang discloses a process for the hydroisomerization of a hydrocarbon feed stream with  $C_{4+}$  hydrocarbons cuts (see Zhang, Abstract) comprising contacting the feed under isomerization conditions with a catalyst composition consisting of zirconium oxide modified with tungsten oxyanion and hydrogenation component of a Group VIII metal (see Zhang, Abstract); wherein the hydrocarbon feed may n-hexadecane (see Zhang, Abstract); wherein the isomerization conditions comprise presence of hydrogen with a hydrogen to hydrocarbon molar ratio between 0.1 to 5 (see Zhang, Table 5), a temperature range from 150°C to 300°C (see Zhang, Table 5), a total pressure of between 1 and 40 bar (see Zhang, Table 5), and a liquid space velocity of between 0.1 to 30  $h^{-1}$  (see Zhang, Table 5); wherein the catalyst composition may comprise 10-50 wt% tungsten oxide (see Zhang, Fig. 1), with a remaining amount comprising zirconia and Group VIII metal (see Zhang, Fig. 1); and wherein the Group VIII metal is platinum and/or palladium in an amount of between 0.01 wt% to 5 wt% (see Zhang, Fig. 1; and page 65).

Zhang does not explicitly disclose wherein the catalyst consists of a mixture of aluminum and zirconium oxides modified with tungsten oxyanion.

However, Yori discloses a platinum-based zirconium oxide catalyst for use in the hydroisomerization of n-butane to produce higher octane species (see Yori, page 218). Yori explains that when a platinum-based aluminum oxide catalyst is mechanically mixed together with the platinum-based zirconium oxide catalyst to form a composite catalyst composition consisting of both aluminum and zirconium oxides, the result is a

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catalyst composition having increased stability and sustained catalyst activation (see Yori, page 222).

Therefore, the person having ordinary skill in the art of processes for the hydroisomerization of  $C_{4+}$  hydrocarbons would have been motivated to incorporate use of aluminum oxides in the platinum-based zirconium oxide catalyst of Zhang (as taught by Yori) in order to achieve a catalyst composition having increased stability and sustained catalyst activation.

Finally, the person having ordinary skill in the art of processes for the hydroisomerization of  $C_{4+}$  hydrocarbons would have had a reasonable expectation of success in incorporating use of aluminum oxides in the catalyst composition of Zhang because: (1) both Zhang and Yori are directed to processes for the hydroisomerization of  $C_{4+}$  hydrocarbon feeds; and (2) the catalysts of both Zhang and Yori are zirconium oxide based catalysts modified with tungsten oxyanion.

### ***Response to Arguments***

13. Applicant's arguments filed 11 June 2008 have been fully considered but they are not persuasive.

14. Examiner understands Applicant's principal arguments to be:

- I. The catalysts disclosed by Chang and Zhang do not contain aluminium.
- II. Yori teaches away from a catalyst composition of platinum/aluminium, because the activity and selectivity of pure platinum/alumina are very low, whereas the addition of sulphated



zirconia gives a better stability and enhances the conversion of n-C<sub>4</sub>.

15. With respect to Applicant's first argument, Examiner notes that Yori (not Chang or Zhang) discloses a catalyst containing aluminium oxide. Thus, Applicant's argument is not persuasive because one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See In re Keller, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); In re Merck & Co., 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

16. With respect to Applicant's second argument, Applicant is correct in saying that Yori teaches the catalytic activity of pure Pt/Al<sub>2</sub>O<sub>3</sub> is very low (see Yori, page 222). However, such argument is irrelevant inasmuch as it does not address the Examiner's rejection based on the combined teachings of Chang and Zhang with Yori. Thus, under the analysis as set forth in the rejection, *supra*, the alumina (aluminium oxide) of Yori would be added to the catalyst compositions of Chang and Zhang (both comprising Pt and zirconium oxide) to yield a catalyst composition such as that claimed by Applicant. From a complete reading of Yori, it is clear that the increased conversion noted by Yori is attributable to the added aluminium oxide (see Yori, page 222) ("[T]he addition of Pt/Al<sub>2</sub>O<sub>3</sub> to SO<sub>4</sub><sup>2-</sup>-ZrO<sub>2</sub> enhances the conversion of n-C<sub>4</sub> as a result of the appearance of a bifunctional reaction mechanism, which could not be obtained by supporting Pt directly over sulfated zirconia.").

***Conclusion***

17. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

18. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Randy Boyer whose telephone number is (571) 272-7113. The examiner can normally be reached Monday through Friday from 10:00 A.M. to 7:00 P.M. (EST).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn A. Caldarola, can be reached at (571) 272-1444. The fax number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only.

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RPB

/Glenn A Caldarola/

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